Estimates of the number of female sex workers in different regions of the world

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Objectives: To collect estimated numbers of female sex workers (FSW) and present proportions of FSW in the female population (FSW prevalence) in different regions of the world.
Methods: Subnational and national estimated numbers of FSW reported in published and unpublished literature, as well as from field investigators involved in research or interventions targeted at FSW, were collected. The proportion of FSW in the adult female population was calculated. Subnational estimates were extrapolated to national estimates if appropriate. Population surveys were scanned for proportions of adult women having sex in exchange for money or goods.
Results: In sub-Saharan Africa, the FSW prevalence in the capitals ranged between 0.7% and 4.3% and in other urban areas between 0.4% and 4.3%. Population surveys from this same region yielded even higher proportions of women involved in transactional sex. The national FSW prevalence in Asia ranged between 0.2% and 2.6%; in the ex-Russian Federation between 0.1% and 1.5%; in East Europe between 0.4% and 1.4%; in West Europe between 0.1% and 1.4%; and in Latin America between 0.2% and 7.4%. Estimates from rural areas were only available from one country.
Conclusions: Although it is well known and accepted that FSW are a highly vulnerable group in the scope of the HIV epidemic, most countries in the world do not know the size of this population group. The estimates of the prevalence of FSW presented in this paper show how important this hard-to-reach population group is in all parts of the world.

In many countries, the HIV epidemic is concentrated in subgroups of the population whose behaviour exposes them to a high risk of acquiring HIV infection. These subgroups include injecting drug users, men who have sex with men, and commercial sex workers—female and male. Numerous studies have documented significantly higher rates of HIV infection in women involved in sex work, when compared to women in the general population.[1] Surveillance of HIV infection among female sex workers (FSW) is needed, not only for monitoring the HIV epidemic but also to provide data needed for the planning, implementation, and evaluation of prevention and care programmes targeted at sex workers. In addition, in some countries with low level or concentrated epidemics, prevention efforts targeting high risk populations such as commercial sex workers have been effective in changing the dynamics of the epidemic. Conducting surveillance and developing appropriate interventions require an understanding of the different types of sex work and the size of this population group. However, FSW are a marginal and stigmatised, hard-to-reach subpopulation: sex work is illegal in most countries and many women prefer not to disclose their sex work activities.

Sex work has many faces with considerable differences between populations, in the way sex work is organised, in levels of visibility, and in risk. Sex work has been defined as the provision of sexual services in exchange for money, goods, or other benefits. Most sex work has a strong economic basis with motivations ranging from survival, debt alleviation, drug dependency, coercion, or a desire for wealth. Sex work is usually classified as ''direct'' (open, formal) or ''indirect'' (hidden, clandestine, informal). Direct FSW are typically women who do define themselves as sex workers and earn their living by selling sex. Indirect FSW are women for whom sex work is not the first source of income. They may work as waitresses, hairdressers, tailors, massage girls, street vendors, or beer promotion girls and supplement their income by selling sex on a regular basis or occasionally. They do not consider themselves as sex workers and often work outside of known venues for sex work. Therefore they are even more difficult to reach than women known as direct sex workers.[2–10] As a consequence, the absolute size of the FSW population remains largely unknown.

In many countries data are available on HIV prevalence among sex workers. However in estimating national HIV prevalence in countries with concentrated epidemics, the lack of information about the size of high risk populations is the limiting factor in producing reasonable estimates of the national HIV prevalence. This paper attempts to provide some guidance about the size of FSW populations for different regions of the world. We reviewed estimated population sizes of FSW from different parts of the world. FSW were defined as women having sex in exchange for money or goods. From these estimates, the proportion of women in the population who engage in sex work was calculated. The validity of the obtained estimates as well as their usefulness for HIV surveillance is discussed.

METHODS

Information sources

Different sources of information were used for estimates on the size of the FSW populations. Firstly, we performed a MEDLINE search for the 10 year period 1995–2005, using the search terms ''female sex workers'', ''sex workers'', ''sex work'', ''prostitutes'', ''prostitution'', and ''vulnerable women''. Additional sources were identified through references from relevant publications. Secondly, we looked for relevant information in HIV/AIDS/STI surveillance reports from national or regional World Health Organization (WHO)/Joint United Nations Programme on HIV/AIDS (UNAIDS) offices, which were obtained via internet or personal

Abbreviations: DHS, Demographic and Health Survey; EUROPAP, European Network for HIV-STD Prevention in Prostitution; FHI, Family Health International; FSW, female sex workers; UNAIDS, Joint United Nations Programme on HIV/AIDS; UNDP, United Nations Development Programme; WHO, World Health Organization.

contacts. Thirdly, we looked for published and unpublished reports on the websites of international agencies involved in interventions or research projects on HIV/AIDS/STI, especially those targeting FSW. Lastly, a lot of information was obtained from leading investigators in the field, who provided us with unpublished data from their projects and documents of workshops or meetings conducted in their region.

The estimates of the numbers of FSW obtained from the above sources were contrasted with estimates of the numbers of women having sex for money or goods, as obtained from the Reproductive Health and Sexual Behaviour surveys (CDC, Measure); Behavioural Surveillance Surveys (FHI); Multiple Indicator Cluster Surveys (MICS, UNICEF) and Demographic and Health Surveys (DHS Measure).

Selection criteria

Only those studies and reports were retained that met the following criteria:

- A definition of FSW was available corresponding to the definition previously mentioned—that is, women selling sex in exchange for money or goods.
- The methods to estimate the numbers of FSW were described. If the methods were not described, estimates were still included if they were reported by a reliable source, such as the United Nations Development Programme (UNDP), WHO, or the European Network for HIV-STD Prevention in Prostitution.
- Only women ⩾15 years were included.
- The geographic area was defined.

Calculation of FSW prevalence

We defined the FSW prevalence as the proportion of FSW in the adult female population (15–49 years):

$$\%\ \text{FSW in area A} = \frac{\text{Estimated number of FSW in area A} \times 100}{\text{Number of adult women living in area A}}$$

The number of adult women was calculated as follows:

Total population number × % women × % women (15–49 years).

The population number, the proportion of women and the proportion of women 15–49 years were taken from the Population Estimates and Projections database of the UN Population Division (http://www.un.org/esa/population/unpop.htm) or, in some cases from national census reports.

Subnational versus national estimates

For a number of countries national estimates were found in reports. For other countries the estimates were subnational, meaning that they were for a limited geographical area in the country only. These estimates were mainly obtained from research or intervention projects that attempted to assess the number of FSW in their intervention area. National estimates were then obtained by extrapolating the subnational estimates. National estimates are presented separately for urban areas, rural areas, and the entire country.

RESULTS

Subnational estimates of numbers of female sex workers

Table 1 presents by country and region in the world: (1) the estimated population size of FSW in subnational areas, (2) the methods used for the estimation, and (3) the FSW prevalence calculated as the percentage of adult women in the area who are FSW.

Most studies used mapping and census of FSW to estimate the number of FSW. This is an elaborate but straightforward method. All sites where sex work is known to occur, openly or hidden, are mapped with the help of informants and key people and at each of these sites women who engage in sex work are counted. In Diego-Suarez, Madagascar, the number of sex workers was estimated using the capture-recapture method. In a first phase, sex workers in predetermined geographic areas are ''captured'' and ''marked'' by giving them a token or an educational brochure on a particular day and time. A few weeks later, in the same places and at the same times, a second sample is ''captured'', which comprises of a certain number of people who were captured in the first round. Under the assumption that the proportion of marked people found in the second round is a reasonable estimate of the marked proportion in the unknown population, the size of the entire population can be estimated. In Indonesia the multiplier method was used. A detailed description of the method can be found elsewhere.[21] In brief, data from one source (an official register of sex workers) were used as basis for the estimation. The numbers obtained from the register were compared with numbers obtained from other sources and the extent to which the numbers on the register were underestimated was assessed. The ''multipliers'' thus obtained were applied to the numbers of sex workers on the register.

For West Africa estimates of the numbers of FSW were available for urban areas in Benin, Cameroon, Ghana, Ivory Coast, Ghana, Burkina Faso, and Niger.[11–13] (Jacques Pépin, personal communication, 2005; Bea Vuylsteke, personal communication, 2005; Julio Soto, personal communication 2005). The FSW prevalence ranged from 0.7% to 4.3% (median 1.7%) in the capitals and from 0.4% to 0.7% (median 0.6%) in the smaller provincial towns. In Cotonou (Benin), Ouagadougou (Burkina Faso), and Niamey (Niger) 32%, 38%, and 70% of estimated numbers of FSW were indirect or hidden sex workers. In Benin, Burkina Faso, and Ivory Coast, 50%–70% of the FSW were between 20 and 29 years old.

For East Africa, subnational estimates were available from two countries. Family Health International (FHI) conducted a mapping and census study in Addis Ababa and Nazareth, the latter being a popular holiday destination located at the crossroads of two major highways in the Oromia Region. The enumeration included three groups of women: (1) street based sex workers, (2) establishment based FSW working in hotels, bars, restaurants, red light houses, pastry shops, tea and coffee houses, beer shops, and (3) women working as waitresses in the same establishments. Among the waitresses 40–45% admitted to being involved in sex work besides their official job. In Addis Ababa and Nazareth, 35% and 30% of the FSW were considered as indirect FSW.[14 15] The majority of FSW were aged 25–29 years old and the reported main motivation for getting into sex work was to generate an income for themselves and their family. In Kenya numbers of FSW were estimated in several locations in the west of the country and along the Mombasa-Kampala highway. The FSW prevalence was 3% in Kisumu, the capital of Nyanza Province,[11] and nearly 7% in the four border and trading centres Busia, Mumias, Nzoia, and Webuye.[5] The ''Hotspot mapping of transactional sex on the Northern Corridor Mombasa-Kampala'' project aimed to quantify the levels of commercial sex work along the major transport route linking the East African coast with the interior of Africa. The Kenyan part of this highway stretches over about 300 miles between Mombasa and Nairobi.[16] The estimated number of FSW along this part of the highway, and excluding Mombasa and Nairobi, was 2700. The highway crosses an area with very low population density. General population data are missing and as such the prevalence of FSW was not calculated for this rural area, but it is expected to be relatively high.

Table 1 Subnational estimated numbers of FSW and FSW prevalence per region

Country	Location	Area	FSW, n	Adult women, n (15–49 years)	% FSW	Estimation method	Year	Reference
Sub-Saharan Africa								
West African countries								
Benin	Cotonou	Capital	1915	133,912	1.4%	Mapping & Census	1997	11
		Capital	1750	149,648	1.2%	Mapping & Census	2001	12
	Porto-Novo	Provincial town	274	55,405	0.5%	Mapping & Census	2004	12
	Abomey/Bohicon	Provincial town	36	68,374	0.1%	Mapping & Census	2004	12
	Parakou	Provincial town	236	50,896	0.5%	Mapping & Census	2000	12
	Kandi	Provincial town	131	34,538	0.4%	Mapping & Census	2004	12
	Malanville	Provincial town	105	8576	1.2%	Mapping & Census	2004	12
Burkina Faso	Ouagadougou	Capital	8000	185,442	4.3%	Mapping & Census	2000–03	PC*
Cameroon	Yaoundé	Capital	5600	252,210	2.2%	Mapping & Census	1997	11
Ivory Coast	Abidjan	Capital	6000	867,266	0.7%	Mapping & Census	2000	PC*
	San Pedro	Provincial town	500	139,525	0.4%	Mapping & Census	NA	PC*
	Bouaké	Provincial town	300	116,738	0.3%	Mapping & Census	2000	PC*
	Korhogo	Provincial town	347	36,327	1.0%	Mapping & Census	2001	PC*
	Aboisso	Provincial town	289	32,500	0.9%	Mapping & Census	2004	PC*
	Daola	Provincial town	497	38,478	1.2%	Mapping & Census	2004	PC*
	Yamoussouka	Provincial town	245	40,177	0.6%	Mapping & Census	2004	PC*
Ghana	Accra-Tema	Capital	5000	457,587	1.1%	Mapping & Census	2003	13
	Sekondi-Takoradi	Provincial town	492	69,099	0.7%	Mapping & Census	2003	PC*
Niger	Niamey	Capital	11,249	427,680	2.6%	Mapping & Census	2004	PC*
East-African countries								
Ethiopia	Addis Ababa	Capital	12,453	599,886	2.1%	Mapping & Census	2002	14
	Nazareth	Provincial town	1172	40,098	2.9%	Mapping & Census	2002	15
Kenya	Kisumu	Provincial town	1374	45,158	3.0%	Mapping&Census	1997	11
	Busia, Mumias, Nzoia, Webuye (W. Province)	4 Provincial towns	1500	21,676	6.9%	Mapping & Census	1999	5
	Highway between Mombassa and Nairobi	Truck stops	2700	–	–	Mapping & Census	2004	16
South-African countries								
Zambia	Ndola	Provincial town	2288	94,761	2.4%	Mapping & Census	1997	11
	Chirundu, Livingstone, Chipata, Nakonde, Kasumbalesa, Kapiri Mposhi	6 truck stops along the Southern highways	1500	55,375	2.7%	Mapping & Census	2000	17
Madagascar	Diego-Suarez	Provincial town	2684	22,500	12.0%	Capture-recapture	2001	18
Asia								
India	Mumbai	Capital of State	14,108	2,974,320	0.5%	Mapping & Census	2001	19
(Maharashtra)	Thane	Provincial town	1335	306,549	0.4%	Mapping & Census	2001	19
	Pune	Provincial town	2632	629,582	0.4%	Mapping & Census	2001	19
	Sangli	District	1191	650,000	0.2%	Mapping & Census	2001	19
Nepal	Kathmandu	District	1657	162,203	1.0%	Mapping & Census	2001	20
	Bhaktapur	District	84	16,898	0.5%	Mapping & Census	2001	20
	Lalithpur	District	267	37,612	0.7%	Mapping & Census	2001	20
Indonesia	Aceh	Province	562	1,095,602	0.05%	Multiplier method	2002	21
	Sumatra Utara	Province	18,659	3,246,372	0.6%	Multiplier method	2002	21
	Sumatra Barat	Province	492	1,184,834	0.04%	Multiplier method	2002	21
	Riau	Province	21,503	1,379,750	1.6%	Multiplier method	2002	21
	Jambi	Province	3360	671,192	0.5%	Multiplier method	2002	21
	Sumatra Selatan	Province	16,233	1,923,786	0.8%	Multiplier method	2002	21
	Bengkulu	Province	1853	436,121	0.4%	Multiplier method	2002	21
	Jawa Barat	Province	18,192	9,961,637	0.2%	Multiplier method	2002	21
	Lampung	Province	5398	1,876,940	0.3%	Multiplier method	2002	21
	Bangka Belitung	Province	726	250,965	0.3%	Multiplier method	2002	21
	Jakarta	Province	32,448	2,331,465	1.4%	Multiplier method	2002	21
	Banten	Province	7202	2,258,127	0.3%	Multiplier method	2002	21
	Jawa Tengah	Province	24,455	8,706,534	0.3%	Multiplier method	2002	21
	Jogjakarta	Province	4627	870,291	0.5%	Multiplier method	2002	21
	Jawa Timur	Province	29,116	9,694,500	0.3%	Multiplier method	2002	21
	Kalimantan Barat	Province	3350	1,119,862	0.3%	Multiplier method	2002	21
	Kalimantan Tengah	Province	6410	517,267	1.2%	Multiplier method	2002	21
	Kalimantan Selatan	Province	2819	832,088	0.3%	Multiplier method	2002	21
	Kalimantan Timur	Province	13,021	683,740	1.9%	Multiplier method	2002	21
	Bali	Province	4304	878,378	0.5%	Multiplier method	2002	21
	Nusa Tengara Barat	Province	845	1,117,910	0.08%	Multiplier method	2002	21
	Nusa Tengara Timur	Province	377	1,066,044	0.04%	Multiplier method	2002	21
	Sulawesi Utara	Province	958	557,979	0.2%	Multiplier method	2002	21
	Sulawesi Tengah	Province	977	606,778	0.2%	Multiplier method	2002	21
	Sulawesi Selatan	Province	2614	2,245,021	0.1%	Multiplier method	2002	21
	Sulawesi Tenggara	Province	1103	507,507	0.2%	Multiplier method	2002	21
	Gorontalo	Province	696	232,282	0.3%	Multiplier method	2002	21
	Maluku	Province	1762	324,303	0.5%	Multiplier method	2002	21
	Maluku Utara	Province	1033	204,118	0.5%	Multiplier method	2002	21
	Papua	Province	9386	617,374	1.5%	Multiplier method	2002	21
Cambodia	Phnom Penh	Province	4727	170,404	2.8%	Census	2003	PC*
	Siem Reap	Province	674	35,473	1.9%	Census	2003	PC*
	Kandal	Province	308	17,198	1.8%	Census	2003	PC*

Table 1 Continued

Country	Location	Area	FSW, n	Adult women, n (15–49 years)	% FSW	Estimation method	Year	Reference
	Battambang	Province	696	42,093	1.7%	Census	2003	PC*
	Kaoh Kong	Province	375	8223	4.6%	Census	2003	PC*
	Prey Veaeng	Province	227	16,744	1.4%	Census	2003	PC*
	Krong Pailin	Province	351	6116	5.7%	Census	2003	PC*
	Pursat	Province	135	17,533	0.8%	Census	2003	PC*
	Kampong Speu	Province	182	12,311	1.5%	Census	2003	PC*
	Kampong Chnang	Province	216	12,548	1.7%	Census	2003	PC*
	Kampong Cham	Province	305	13,534	2.3%	Census	2003	PC*
	Takeo	Province	191	11,735	1.6%	Census	2003	PC*
	Kampot	Province	146	10,012	1.5%	Census	2003	PC*
	Kratie	Province	138	23,205	0.6%	Census	2003	PC*
	Kampong Thom	Province	141	19,760	0.7%	Census	2003	PC*
	Preah Vihear	Province	78	6318	1.2%	Census	2003	PC*
	Svay Rieng	Province	63	6382	1.0%	Census	2003	PC*
	Stung Treng	Province	57	7081	0.8%	Census	2003	PC*
	Sihanoukville	Province	528	45,812	1.2%	Census	2003	PC*
	Bantey Mean Chey	Province	622	29,548	2.1%	Census	2003	PC*

*Personal communications: Burkina Faso and Niger (Julio Soto, 2005); Ivory Coast (Bea Vuylsteke, 2005); Ghana (Jacques Pépin, 2005); Cambodia (François Crabbé, 2005).

In Zambia, in Southern Africa, two studies have estimated the numbers of FSW, one in Ndola (the second largest city in the country), and one in six truck stops along the border with Zimbabwe and Malawi.[11 17] The prevalence of FSW was estimated at 2.4% in Ndola and 2.7% in the truck stops. In Diego-Suarez, a provincial capital and port city in Madagascar, an attempt was made to enumerate the FSW population through the capture-recapture method.[18] An estimated 12% of the adult female population in this town would be involved in sex work.

Subnational estimates of numbers of FSW were found for four countries in Asia, including India, Nepal, Indonesia, and Cambodia. In the State of Maharashtra in India, mapping and census of FSW was conducted in the capital Mumbai, in two smaller towns and in the district of Sangli, located on a national highway.[19] Enumeration of women selling sex was done at brothels, private houses, hotels, bars, or pick-up points (for example, parks, streets, truck stops). In Sangli, where the mapping and census was conducted in an urban and a rural area, 75% of brothels were found in rural sites. Rural FSW were largely a hidden group and although villagers were aware of their existence, their presence was not openly acknowledged. A similar mapping study was carried out in the Kathmandu Valley of Nepal, covering three districts.[20] In Indonesia, estimates of FSW were obtained for all provinces, using the multiplier method.[21] In each province the Department of Social Affairs keeps a register of direct FSW. The data from these registers were compared with numbers of women working in the entertainment industry obtained from the Department of Tourism, and the results from an enumeration study conducted by a local NGO on Bali. In Cambodia, where sex work, while illegal, is quite visible, the Ministry of Health each year provides estimates of numbers of FSW, both direct and indirect, based on enumeration of establishments and sex workers. About two thirds of FSW are indirect sex workers and nearly 80% are less than 25 years old (François Crabbé, personal communication, 2005).

Subnational estimates from the other regions of the world could not be found using the search criteria established for this review of the literature.

National FSW prevalence: estimates and extrapolations (table 1)

Table 2 presents national estimates of the FSW prevalence for the capital, urban, and rural areas, and the country as a whole. The national estimates for the African region were mainly extrapolated from subnational estimates. However we did not calculate a national estimate for Madagascar, as only one extremely high subnational FSW prevalence was available (Diego-Suarez, 12%; table 1) which was probably not representative for all urban areas of the country. The limited data that are available suggest that the median FSW prevalence in the urban areas of Eastern and Southern Africa might be higher than in West Africa (3.6% and 2.4% *v* 0.6%).

For four countries in Asia, including Malaysia, Nepal, the Philippines, and Vietnam, national estimates on numbers of FSW were found in STI, HIV, and AIDS surveillance reports.[22–25] FSW prevalence ranged between 0.2% in Vietnam and 2.5% in the Philippines. The national estimate of FSW prevalence in Indonesia was calculated from the estimates of FSW and women in each province (table 1). For the country as a whole the national FSW prevalence was estimated at 0.4%. For Cambodia the national estimate was calculated using two different methods. The first method employed the data per province presented in table 1, and estimated the FSW prevalence at 0.3%. The second method was based on a study on trafficked people in Cambodia.[26] Steinfatt *et al* collected countrywide data on numbers of FSW. Within each province, all major towns were visited, as well as six villages of which three were along a more heavily travelled rural route and three were designated as ''difficult to access''. They estimated that about 29% of FSW were in the capital Phnom Penh, about 12% in other major cities, 33% in smaller towns, 21% in villages, and 5% in special settlements. If special settlements were excluded, 22% of FSW could be found in rural areas, and 78% in urban areas. The FSW prevalence was estimated at 0.5% for the capital, 0.4% for the other urban settings, and 0.1% for the rural areas. Considering that 17% of the population of Cambodia lives in urban areas, the national FSW prevalence was estimated at 0.4%.

For the Central and Eastern European and the ex-Russian Federation countries, national estimates of FSW were found in a UNDP report on HIV/AIDS in the region. The data were drawn from official national sources, but the estimation methods were not described.[27] For Western Europe data were retrieved from reports of the European Network for HIV-STD Prevention in Prostitution (EUROPAP) which did not mention estimation methods either.[28–30] For the ex-Russian Federation countries, the median FSW prevalence was 0.6%

Table 2 National estimated numbers of FSW per country and per region in the world

Country	Estimated FSW prevalence				Year	Reference
	Capital	Other urban	Rural	Overall		
Sub-Saharan Africa						
West Africa						
Benin	1.2%	0.4%	–	–	2001	–
Burkina Faso	4.3%	–	–	–	2000–03	–
Cameroon	2.2%	–	–	–	1997	–
Ivory Coast	0.7%	0.6%	–	–	2000–04	–
Ghana	1.1%	0.7%	–	–	2003	–
Niger	2.6%	–	–	–	2004	–
East Africa						
Ethiopia	2.1%	2.9%	–	–	2002	–
Kenya	–	4.3%	–	–	1997–99	–
South Africa						
Zambia	–	2.4%	–	–	1997	–
Asia						
Cambodia	–	–	–	0.3%	2003	–
Cambodia	1.4%	1.5%	0.1%	0.4%	2003	26
India (Maharashtra)	0.5%	0.4%	–	–	2001	–
Indonesia	–	–	–	0.4%	2002	–
Malaysia	–	–	–	0.9%	1999	22
Nepal	–	–	–	2.0%	2000	23
Philippines	–	–	–	2.6%	2000	24
Vietnam	–	–	–	0.2%	2000	25
Ex-Russian Federation						
Western CIS						
Russian Federation	–	–	–	0.5%	2004	27
Ukraine	–	–	–	0.4%	2004	27
Belarus	–	–	–	0.6%	2004	27
Baltic States						
Estonia	–	–	–	1.1%	2004	27
Latvia	–	–	–	1.5%	2004	27
Lithuania	–	–	–	0.7%	2004	27
Caucasus						
Armenia	–	–	–	1.0%	2004	27
Azerbaijan	–	–	–	1.5%	2004	27
Georgia	–	–	–	0.7%	2004	27
Central Asia						
Kazakhstan	–	–	–	0.8%	2004	27
Uzbekistan	–	–	–	0.3%	2004	27
Kyrgyzistan	–	–	–	0.2%	2004	27
Tajikistan	–	–	–	0.3%	2004	27
Turkmenistan	–	–	–	0.1%	2004	27
Europe						
East Europe						
Bulgaria	–	–	–	0.6%	2004	27
Romania	–	–	–	0.8%	2004	27
Albania	–	–	–	0.7%	2004	27
FR Macedonia	–	–	–	0.6%	2004	27
Croatia	–	–	–	0.5%	2004	27
BosniaHerzegovina	–	–	–	0.5%	2004	27
Serbia/Montenegro	–	–	–	0.6%	2004	27
Czech republic	–	–	–	0.4%	2004	27
Hungary	–	–	–	0.6%	2004	27
Poland	–	–	–	0.6%	2004	27
Slovakia	–	–	–	0.4%	2004	27
Slovenia	–	–	–	1.4%	2004	27
West Europe						
Belgium	–	–	–	0.4%	2000	28
Netherlands	–	–	–	0.6%	2000	28
Luxembourg	–	–	–	0.4%	2000	28
United Kingdom	–	–	–	0.5%	2000	28
France	–	–	–	0.2%	2000	28
Austria	–	–	–	1.0%	2000	29
Germany	–	–	–	1.4%	2000	29
Denmark	–	–	–	0.4%	2000	29
Sweden	–	–	–	0.1%	2000	29
Finland	–	–	–	0.3%	2000	29
Norway	–	–	–	0.3%	2000	29
Greece	–	–	–	0.4%	2000	30
Italy	–	–	–	0.4%	2000	30
Latin America						
Dom Republic	–	–	–	1.8%	2001	3
Belize	–	–	–	7.4%	2001	3
Haiti	–	–	–	2.0%	2001	3
Bolivia	–	–	–	0.2%	–	3
Colombia	–	–	–	0.7%	2001	3
Peru	–	–	–	0.3%	2001	3
Venezuela	–	–	–	1.5%	2001	3

Table 3 Proportion of adult women having paid sex in the last 12 months (general population surveys)

	% Adult women having sex in exchange for money or goods						
Country	Capital	Other urban	Total urban	Total rural	Overall	Year	Reference
West Africa							
Ivory Coast d'Ivoire	4.%	3.4%	4.0%	2.1%	2.9%	1998–99	31
Guinée	–	–	5.4%	2.8%	3.6%	1999	32
Niger	4.5%	5.0%	4.8%	0.6%	1.4%	1998	37
Nigeria	–	–	9.1%	8.5%	8.7%	2003	34
Sierra Leone	–	–	–	–	5.3%	2002	36
East Africa							
Kenya	–	–	6.6%	5.1%	5.5%	2003	34
South Africa							
Madagascar	3.5%	–	4.4%	3.4%	3.6%	2003–04	35

(range 0.1%–1.5%), for the Eastern European countries it was 0.6% (range 0.4%–1.4%), and for Western Europe 0.4% (range 0.1%–1.4%).

National estimates from the Latin American region were available from National AIDS Programmes in Belize, Dominican Republic, Haiti, Bolivia, Colombia, Peru, and Venezuela.[3] In Belize the FSW prevalence was estimated at 7.4%, in the other countries it ranged between 0.2% and 2.0%.

General population surveys (table 3)

A different approach to estimating the FSW prevalence is to try and identify FSW in population based surveys. Most surveys on sexual behaviour asked men about ''exchanging sex for money or goods'' or ''having paid sex''. Fewer studies have also asked women. The Demographic and Health Survey (DHS) conducted in Ivory Coast, Guinea, Niger, Kenya, and Madagascar asked women whether they had paid sex in the past 12 months or had received money, gifts, or other favours for sex in the past 12 months.[31–35] Also in the national surveys in Sierra Leone and Nigeria this question was asked.[36 37] The percentage of women who admitted that they had sex in exchange for money or goods ranged between 1.4% in Niger and 8.7% in Nigeria. These percentages were by and large higher than the FSW prevalence estimated by other methods.

DISCUSSION

Estimating the population size of FSW in the different countries of the world is a very ambitious objective. Sex workers are a hard-to-reach population group and the extent to which sex workers can be reached depends on the country's legal view and the level of stigma towards sex workers. The number of FSW also changes constantly over time and by place: women move in and out of sex work according to their financial needs, they migrate from rural to urban settings, follow seasonal labourers and tourists, or move through a country or in between countries along highways. Furthermore, statistics reported by different sources may be very misleading. Antiprostitution organisations may produce inaccurate figures, as they will tend to overestimate the numbers of sex workers. Governments may tend to underestimate the numbers because of a more restrictive view of sex work and may therefore fail to enumerate indirect and part time sex workers. Results from epidemiological research, using surveys and questionnaires, may be biased as they will not always reveal the ''truth'': sex workers or women in general may not wish to give accurate descriptions of their lives, work, and sexual behaviour, for reasons of pride, fear, or shame.

Our search resulted in a patchwork of estimates retrieved for a diversity of geographical areas and estimated by a diversity of methods. Estimation methods included mapping and census, capture-recapture exercises, and multiplier methods. For some countries national surveillance data were available. Geographical areas varied from major town, a single smaller town, some truck stops along a highway, to an entire country. Many gaps are left: within a country, data were usually missing for rural areas; within a region data were only available for one or a few countries, and no data were found for North America, Australia, Northern Africa, and the Middle East.

The most precise data were obtained by organisations involved in HIV/STI research or interventions for FSW, as they need to know the size of their target population in order to evaluate the coverage or the performance of their activities. The methods used by these organisations included detailed mapping and census and the capture-recapture method. These methods likely provide the most accurate data but they are elaborate to apply. As a result accurate data were limited to certain geographical areas only, including a capital, a major town, or another hotspot of transactional sex (truck stops, a tourist resort). These locations may not be representative for the rest of the country. The national urban estimates extrapolated from these local projects may thus be overestimates. For several countries the national FSW estimates were retrieved from national sources (for example, governmental departments, HIV surveillance). These data may be prone to underestimation, as hidden FSW may be reluctant to collaborate with national authorities, especially in countries where there is little tolerance towards FSW.

Information on FSW, whether qualitative or quantitative, is commonly available from urban settings or special situations where many potential clients may be found (for example, border and trading centres, truck stops). Truck stops along the highways in Kenya and Zambia are an example of high risk settings outside urban areas. However it is difficult to find out how important the presence of FSW is in rural settings. We found only two reports mentioning FSW in the rural area. According to Steinfatt *et al* who considered many types of geographic settings in Cambodia, about 22% of FSW are located in villages defined as ''a collection of dwelling units, usually without substantial buildings forming a business section, and usually with 250 or fewer residents in the collectivity'', but none were found in the actual rural area, defined as ''small collections of scattered dwellings usually with 50 or fewer residents living near to each other but not in the proximity of a village''.[26] For this paper we have considered *villages* as a rural area, and the larger settings, towns, and cities, as urban areas. The other report was from Maharashtra in India, more specifically the Sangli district, where 75% of brothels were found in the rural area.[19] These data however are likely not to be representative of India.

Most of the estimates presented are probably underestimates. The data obtained through surveillance, from national authorities or even from the more sophisticated mapping exercises will have included only a certain proportion of the so-called hidden sex workers. Nevertheless, the data that are available indicate that the population size of FSW in whatever region of the world is quite important.

A different approach is to use general population surveys to estimate the numbers of adult women who report having sex in exchange for money or goods. Such data were available for a handful of countries in sub-Saharan Africa only. Population surveys will tend to underestimate the numbers of FSW: they may not be detected unless the sample size is very large; they may not live in what is generally considered as households (some FSW may live in brothels or other establishments); and women will be reluctant to reveal a behaviour that is stigmatised.[39] However, estimates obtained from the population surveys were considerably higher than those obtained from FSW estimation projects from the same country. In the Ivory Coast for instance, the FSW prevalence estimated by mapping and census in the capital was 0.7%, compared to 4.4% of adult women in the population survey who declared that they had had sex for money or goods.

The conventional definition of female sex workers—women having sex in exchange for money or goods—may do very well in most parts of the world, but may not be valid for populations where sex in exchange for money or goods is commonly accepted in sexual transactions by a wide range of women, irrespective of their socioeconomic status.[38] In the Multicentre Study on Factors Determining the Differential Spread of HIV in four African Cities, a relatively high proportion of adult women had exchanged sex for money or gifts in the last 12 months, ranging from 1.2% in Cotonou (Benin), to 6.4% in Ndola (Zambia), 6.6% in Yaoundé (Cameroon), and 8.5% in Kisumu (Kenya).[40] It is obvious that not all these women can be considered as FSW. At a regional UNAIDS workshop on sex work in West and Central Africa (Abidjan, Cote d'Ivoire, 21–24 March 2000) a more suitable definition for FSW in this region was proposed: ''*sex work is any agreement between two or more persons in which the objective is exclusively limited to the sexual act and ends with that, and which involves preliminary negotiations for a price. Hence there is a distinction from marriage contracts, sexual patronage and agreements concluded between lovers that could include presents in kind or money, but its value has no connection with the price of the sexual act and the agreement does not depend exclusively on sexual services.*''

For surveillance purposes, a more practical definition may be needed, which includes all women, whether considered conventionally as FSW or not, who have a high number of sexual partners and exchange sex for money or goods in order to earn their living, totally or partly.

In conclusion, considering that HIV epidemics tend to be concentrated in hard-to-reach subpopulations such as FSW, more efforts should be made by governments and other organisations to obtain reliable estimates of the population size of these vulnerable women in different areas of their country. The wide ranges in the number of women reporting commercial sex work is certainly related not only to the definitions used by researchers and the women themselves in defining sex work, but also by the temporal variations in sex work, the various levels of stigma linked to sex work, and the tendency of women who might be considered commercial sex workers to be a hidden population. The approach chosen by Steinfatt *et al* in Cambodia may be a good example for other countries. Although the national or subnational FSW prevalence presented in this paper are only very rough estimates, they indicate that in most countries in the world the FSW population is not a negligible subgroup.

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AUTHORS' CONTRIBUTIONS

Judith Vandepitte performed the search for data on numbers of FSW and collated the data, as part of a contract with UNAIDS. She wrote the first draft of the paper. Rob Lyerla assisted Judith with the search and provided comments. Gina Dallabetta, François Crabbé, and Michel Alary provided data and background information on certain countries. They contributed to the redaction of the manuscript. Anne Buvé gave input in the methodology and interpretation of the data, as well as in the writing of the manuscript.

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